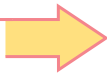




When the last member of a species dies without any surviving offspring, we say that that species has become **extinct**. Every species alive today is related to many other species that have already become extinct. Becoming extinct is not a sign of inferiority, but just another sign that ecosystems are constantly changing. In fact, it is estimated that 99.9% of all species that have ever lived on Earth are now extinct. Today, species that have such a small population that they are in danger of becoming extinct are called **endangered species**.

CHALLENGE



What are the trade-offs in deciding whether to save an endangered species or to re-create an extinct one?



Extinct animals include dinosaurs and saber-toothed cats.



Endangered animals include tigers and gorillas.

MATERIALS



For each student

- 1 Student Sheet 89.1, "Three-Level Reading Guide: Here Today, Gone Tomorrow?"
- 1 Student Sheet 89.2, "Discussion Web: Should the Asian Elephant be Saved?"

PROCEDURE

Use Student Sheet 89.1, "Three-Level Reading Guide: Here Today, Gone Tomorrow?" to guide you as you complete the following reading.

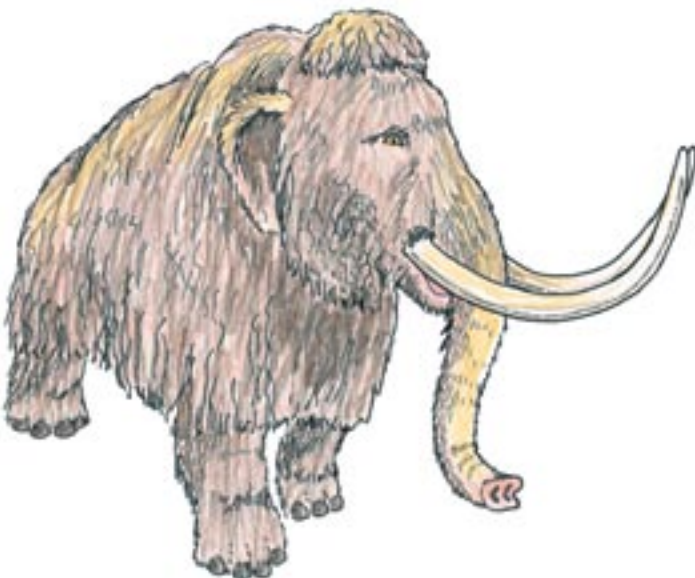
Mammoths and Elephants

You may know that dinosaurs became extinct about 65 million years ago, 64 million years before humans evolved. There is evidence that at least one enormous asteroid crashed into Earth at that time. Many scientists believe that this created huge clouds of dust that blocked out the sun for a long period of time. Plants and other producers form the base of the food web. A loss of sunlight would cause the death of many producer species, which, in turn, would cause the death of many consumer species, such as dinosaurs. By the time the dust settled and sunlight could reach Earth's surface, thousands of species, including the dinosaurs, had become extinct and most ecosystems were greatly changed.

One species that became extinct much more recently is the mammoth. If mammoths were still around, they would be close relatives of the elephants

living on Earth today. The entire bodies of some mammoths were trapped during the most recent ice age and have remained frozen ever since. Explorers have tasted mammoth meat, as have several curious scientists! Some scientists think that the tissue of frozen mammoths is in good enough shape to bring mammoths back from the dead.

Mammoths evolved 3 to 4 million years ago, about 60 million years after dinosaurs became extinct (Figure 1). Mammoths thrived and spread to North America about 1.8 million years ago. But about 10,000 years ago, all but a few small herds of mammoths died. The last mammoth died



Activity 89 • Here Today, Gone Tomorrow?

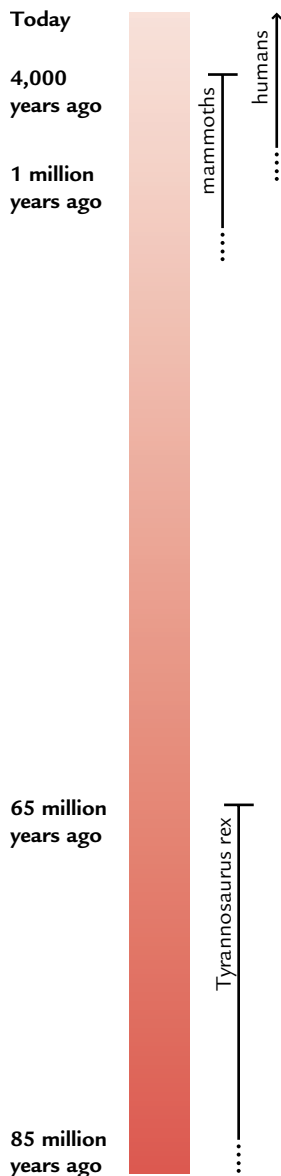


FIGURE 1:
TIMELINE

around 4,000 years ago. There is no evidence that an asteroid or other catastrophic event brought about the extinction of the mammoths.

What did happen 10,000 years ago that caused this huge drop in the mammoth population? One possibility is that the mammoths could not survive the drastic changes in climate and vegetation that occurred when the last ice age ended. In addition, humans—who lived at the same time as the mammoths—were moving into new environments as their population grew. The end of the last ice age helped expand the range of humans into areas where mammoths lived. Increased hunting of mammoths by humans may have contributed to their extinction.

While mammoths and modern elephants are closely related, mammoths are not direct ancestors of modern elephants. In fact, until the mammoth became extinct, mammoths and elephants were alive in different parts of the world. Based on fossil remains, the common ancestor of both modern elephants and mammoths is estimated to have lived 4 to 5 million years ago. The fossil considered to be the first member of their order is dated at about 55 million years ago. Since then, scientists believe that there have been over 500 different elephant and mammoth species. Only two of these species are alive today: the Asian (or Indian) elephant and the African elephant. Figure 2 shows a “family tree” including modern elephants and several extinct relatives. Populations of both African and Asian elephants are declining, and the Asian elephant is considered an endangered species.

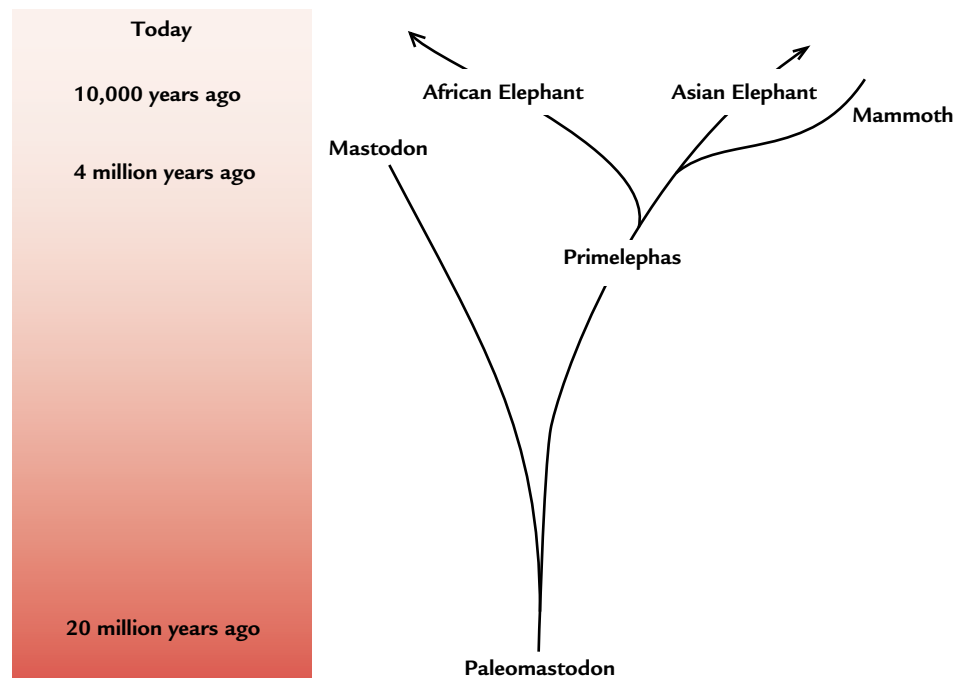


FIGURE 2: EVOLUTION OF MODERN ELEPHANTS



African elephant



Asian elephant

The Asian elephant is smaller than the African, with smaller ears and a slightly rounded or flat back. Asian elephants have a double-domed forehead (African elephants have only a single dome). In addition, Asian elephants have a single “finger” on the upper tip of the trunk, while African elephants have a second on the lower tip.

Unlike African elephants, which all have tusks, only the male Asian elephants have them. In fact, even some of the male Asian elephants do not grow tusks! Killing elephants for their ivory is illegal in India and China. Still, most of the large-tusked male Asian elephants have already been killed for their ivory.

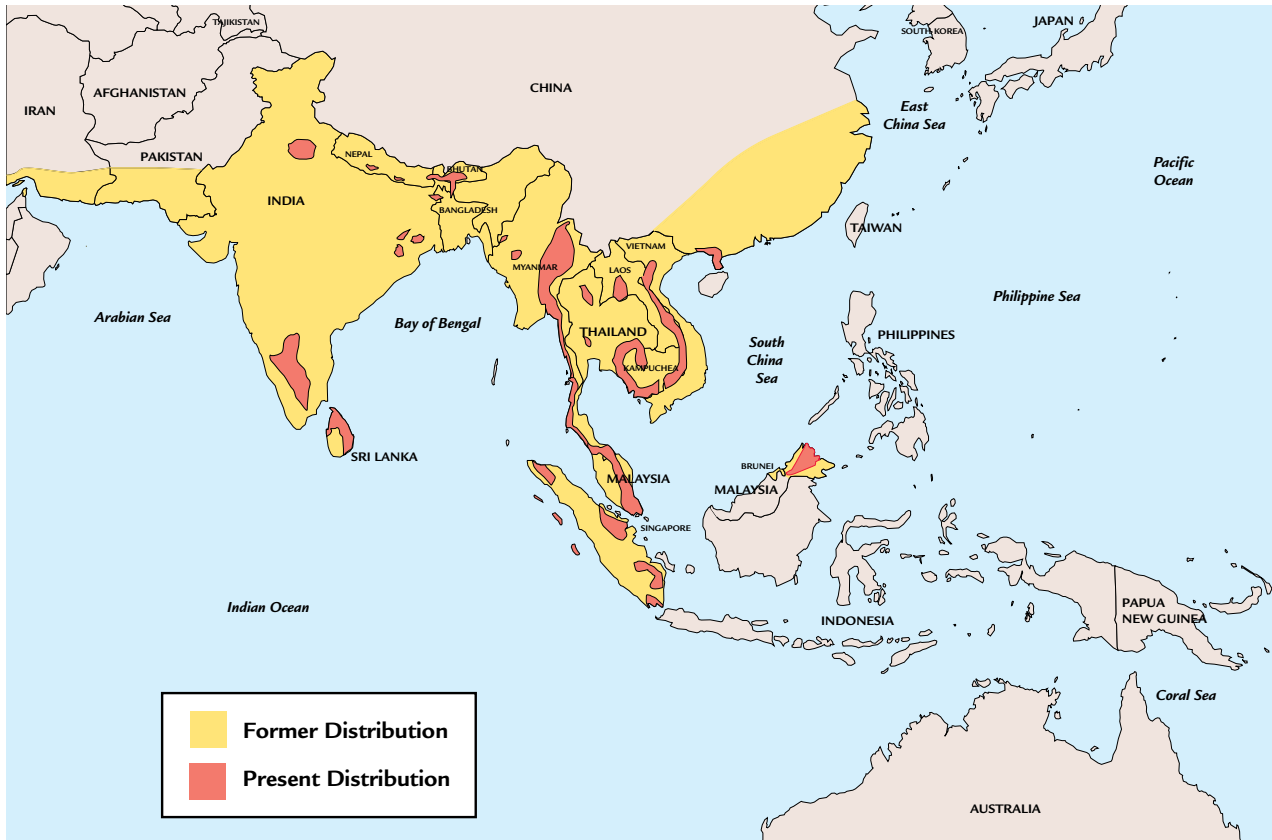
Asian elephants used to roam from Iran to southern Asia (see the map on the next page). In the early 1900s, approximately 250,000 Asian elephants lived in the wild. Today, it is estimated that no more than 50,000 Asian elephants are left. Their population has declined by more than 80% in less than 100 years! Without intervention, Asian elephants will most likely become extinct. By passing laws, raising money, creating wildlife preserves, and raising awareness, some people are working hard to save the Asian elephant.

Not all people are fighting to save Asian elephants. Asian elephants are forest animals. As the human population increases, forests have been cut down to build farms and villages. Today, most wild Asian elephants have been forced to live in hill and mountain regions. A single adult elephant eats about 330 pounds of grasses, roots, leaves, and bark each day, and

Activity 89 • Here Today, Gone Tomorrow?

these environments cannot always supply enough food. Elephant herds often seek out nearby farms that grow crops such as sugar cane and grains. These farms suffer crop loss, property damage, and even loss of life. In an average year, Asian elephants kill approximately 300 people in India alone.

Loss of habitat, combined with human hunting, has caused the decline in the Asian elephant population, a situation similar to that faced by the mammoth several thousand years ago. Should the Asian elephant be saved, or should this species be allowed to become extinct, just like the mammoth and millions of other species before it? Are people spending too much time, energy, and money trying to save endangered species? Or should efforts be increased, perhaps by going so far as to try to re-create extinct species, as has been proposed for the mammoth?



HISTORIC AND CURRENT RANGE OF ASIAN ELEPHANTS

ANALYSIS



1. What are the similarities and differences between the extinction of mammoths and the possible extinction of Asian elephants?



2. Use evidence from this activity to explain why the mammoth could once have been considered an endangered species.
3. Some scientists would like to try to re-create a living mammoth by removing the DNA from a fertilized elephant egg and replacing it with mammoth DNA.
 - a. Which species of elephant egg do you think scientists should try first?
 - b. Do you think scientists should try to re-create a living mammoth? Explain.



4. Should people try to save wild populations of the Asian elephant? Support your answer with evidence and discuss the trade-offs of your decision.

Hint: To write a complete answer, first state your opinion. Provide two or more pieces of evidence that support your opinion. Then discuss the trade-offs of your decision.



EXTENSION

Learn more about attempts to save the Asian elephant from extinction and proposals to bring the mammoth back to life. Start at the *Issues and Life Science* page of the SEPUP website.